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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/955,767	09/19/2001	Takahiro Kamai	5077-000066	9825

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EXAMINER	
VO, HUYEN X	

ART UNIT	PAPER NUMBER
2655	5

DATE MAILED: 07/01/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/955,767	KAMAI ET AL.	
	Examiner	Art Unit	
	Huyen Vo	2655	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 9/19/2001.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-9 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-9 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 01 February 2002 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 4.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

2. Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Ding et al. (IEICE Trans. Inf. & System Publication).

3. Regarding claim 1, Ding et al. disclose a speech synthesis system, which synthesizes speech using time series data of formant parameters (including a formant frequency and a formant bandwidth) estimated based on a speech production model, the speech synthesis system comprising determining the correspondence of formant parameters between adjacent frames using dynamic programming (*section 2 on Speech Production Model pages 739-741*).

4. Claim 7 is rejected under 35 U.S.C. 102(e) as being anticipated by Ma et al. (US Patent No. 6470308).

5. Regarding claim 7, Ma et al. disclose a speech analysis method, in which a sound source parameter and a vocal tract parameter of a speech signal waveform are estimated by using a glottal source model including an RK voicing source model, the speech analysis method comprising the steps of:

extracting an estimated voicing source waveform using a filter which is constituted by the inverse characteristic of an estimated vocal tract transfer function (*col. 4, ln. 25-67*);

estimating a peak position corresponding to a GCI (glottal closure instance) of the estimated voicing source waveform with higher accuracy at closer time intervals than that with the sampling period by applying a quadratic function (*col. 5, ln. 1 to col. 6, ln. 67*);

synthesizing the GCI with a sampling position in the vicinity of the estimated peak position and thereby generating a voicing source model waveform (*col. 5, ln. 1 to col. 6, ln. 67*); and

time-shifting the generated voicing source model waveform with higher accuracy at closer time intervals than that with the sampling period by means of all pass filters and thereby matching the GCI with the estimated peak position (*col. 6, ln. 12 to col. 7, ln. 10*).

6. Claims 8-9 are rejected under 35 U.S.C. 102(a) as being anticipated by Ohtsuka et al. (International Conference on Spoken Language Processing).

7. Regarding claim 8, Ohtsuka et al. disclose a speech analysis method, in which a voicing source parameter and a vocal tract parameter of a speech signal waveform are estimated by using a glottal voicing source model such as an RK model or a model defined as a modified model thereof, the speech analysis method comprising the steps of:

extracting an estimated voicing source waveform using filters which are constituted by the inverse characteristic of an estimated vocal tract transfer function (*sections 2-3.3*); and

assuming the first harmonic level as H1 and the second harmonic level as H2 in DFT (discrete Fourier transformation) of the estimated voicing source waveform and estimating an OQ (open quotient) from a value for HD defined as HD=H2-H1 (*section 3.5 on Estimating Open Quotient*).

8. Regarding claim 9, Ohtsuka et al. further disclose a method for estimating the OQ, the relation:OQ=3.65HD-0.273HD.sup.2+0.0224HD.sup.3+50.7is used (*section 3.5 on Estimating Open Quotient*).

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. Claims 2-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ding et al. (IEICE Trans. Inf. & System Publication) in view of Ohtsuka et al. (International Conference on Spoken Language Processing).

11. Claim 2 is dependent on claim 1, which is anticipated by Ding et al. for reasons stated above.

12. Regarding claims 2-4, Ding et al. do not disclose that in determining the correspondence of the formant parameters, a connection cost d.sub.c(F(n), F(n+1)) and a disconnection cost d.sub.d(F(k)) are obtained using the equations:d.sub.c(F(n),F(n+1))=.alpha..vertline.F.sub.f(n)-F.sub.f(n+1).v-ertline.+.beta..vertline.F.sub.i(n)-F.sub.i(n+1).vertline. 26 d d (F (k)) = F f (k) - F f (k) + F i (k) - = F i (k) - where .alpha. and .beta. are predetermined weight coefficients, F.sub.f(n) is a formant frequency in the n.sup.th frame, that F.sub.i(n) is a formant intensity in the n.sup.th frame and .epsilon. is a predetermined value, and the resultant d.sub.c(F(n), F(n+1)) and d.sub.d(F(k))are used as costs for grid point shifting in dynamic programming; two adjacent frames in which exists a formant which has no counterpart to be connected, a formant having the same frequency as that of the disconnected formant in one of the frames and an intensity of is located in the other frame and the two adjacent

frames are connected by interpolation of frequencies and intensities of both the formants according to a smooth function; and the formant intensity F.sub.i(n) is calculated using 27 F i (n) = [20 log 10 (1 + - F b (n) / Fs 1 - - F b (n) / F s) , if formant 20 log 10 (1 - - F b (n) / F s 1 + - F b (n) / F s) , if anti - formant where F.sub.b(n) is a formant bandwidth in the n.sup.th frame and F.sub.s is a sampling frequency.

However, Ohtsuka et al. teach that in determining the correspondence of the formant parameters, a connection cost d.sub.c(F(n), F(n+1)) and a disconnection cost d.sub.d(F(k)) are obtained using the equations:d.sub.c(F(n),F(n+1))=.alpha..vertline.F.sub.f(n)-F.sub.f(n+1).v-ertline.+.beta..vertline.F.sub.i(n)-F.sub.i(n+1).vertline. 26 d d (F (k)) = F f (k) - F f (k) + F i (k) - = F i (k) - where .alpha. and .beta. are predetermined weight coefficients, F.sub.f(n) is a formant frequency in the n.sup.th frame, that F.sub.i(n) is a formant intensity in the n.sup.th frame and .epsilon. is a predetermined value, and the resultant d.sub.c(F(n), F(n+1)) and d.sub.d(F(k))are used as costs for grid point shifting in dynamic programming (***equations 26-27 in section 4.2 Optimum Formant Connection***); two adjacent frames in which exists a formant which has no counterpart to be connected, a formant having the same frequency as that of the disconnected formant in one of the frames and an intensity of is located in the other frame and the two adjacent frames are connected by interpolation of frequencies and intensities of both the formants according to a smooth function (***section 4.2 Optimum Formant Connection***); and the formant intensity F.sub.i(n) is calculated using 27 F i (n) =

[20 log 10 (1 + - F b (n) / Fs 1 - - F b (n) / F s) , if formant 20 log 10 (1 - - F b (n) / F s 1 + - F b (n) / F s) , if anti - formant where F.sub.b(n) is a formant bandwidth in the n.sup.th frame and F.sub.s is a sampling frequency (***equation 28 in section 4.2 Optimum Formant Connection***).

Since Ding et al. and Ohtsuka et al. are analogous art because they are from the same field of endeavors, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Ding et al. by incorporating the teaching of Ohtsuka et al. in order to eliminate click sounds in the transition between vocalic and weak voiced consonantal segments to enhance the naturalness of speech.

13. Regarding claims 5-6, Ding et al. further disclose that the vocal tract transfer function including a plurality of formants is implemented by a cascade connection of a plurality of filters and wherein when a formant which has no counterpart to be connected exists in the adjacent frames and thus the connection of the filters needs to be changed, a coefficient and an internally stored data of the filter in question are copied into another filter and the first filter is then over written with a coefficient and an internally stored data of still another filter or initialized to predetermined values (*pages 740-741, the estimation of x(n) is updated recursively updating previously content with newly calculated content*).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Huyen Vo whose telephone number is 703-305-8665. The examiner can normally be reached on M-F, 9-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Doris To can be reached on 703-305-4827. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Examiner Huyen X. Vo

June 24, 2004

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W. R. YOUNG
PRIMARY EXAMINER